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XIII. *Account of the Transit of Mercury, observed at Cambridge, November 12, 1782. By JAMES WINTHROP, Esquire, F. A. A.*

THE following observations were made at the house of the Reverend Professor *Williams*. We used the same clock, but observed the transit from different parts of the house. The clock was regulated by the Professor, who reduced all the observations to apparent time. Mine were as follow :

First external contact,	10 ^h 6' 31" A. M.
First internal contact when the thread of light was formed, and Mercury recovered his roundness,	10 12 13
Mercury begun to appear oblong before the second internal contact,	11 21 41
Doubtful whether the thread of light was broken,	11 22 44
Second internal contact when the thread of light was compleatly broken,	11 23 5
Second external contact,	11 29 19

The magnifying power of the reflecting telescope used in these observations, was 260. The elliptical appearance of the planet was observed by Mr. *Williams* as well as myself, at both passages over the sun's limb ; but I do not recollect to have seen it remarked of any former transit of this planet. An idea that the smallness of Mercury's apparent diameter and the rapidity of his motion would not suffer it to be of any long continuance, prevented my making more particular remarks at the time of the ingress. The certainty of a sufficient interval between

tween the last contacts, enabled me to attend more particularly to this observation at the end, than at the beginning of the transit. At $11^h 21' 41''$ apparant time, Mercury began to appear distorted ; and from this time the thread of light grew gradually fainter till $11^h 22' 44''$, when I was doubtful whether it existed any longer. I set down the second internal contact at $11^h 23' 5''$, when I was first certain that the thread of light was broken. From the time that the center of the planet appeared to me to have passed the sun's limb, the appearance of it's following half became very irregular, being disturbed by a brisk undulatory motion, which continued till the end of the transit.

This distortion appears to be common to both the inferior planets, when in the same situation with respect to the observer. At the transit of Venus in 1761, it was observed in *India, England* and *Sweden* ; and at that of 1769, by almost all who observed the transit. They indeed vary in their ideas of its duration ; which cannot be wondered at when we consider the different magnifying power of their instruments, and the different strength of their eyes. Particular descriptions of the appearance of Venus, in her two transits, are published in Vols. LIX. LX. and LXI. of the Philosophical Transactions, with suitable projections ; and from the great resemblance they bear to the appearance of Mercury in his last transit, the conclusion is natural that they arose from the same cause.

The object is so small and remote, that we can hardly expect to determine it's cause with absolute certainty. It will not, however, be deemed amiss to remark, as a *probable* cause only, that the rays proceeding from so small an object as that part of the sun's limb which is nearest to the planet, during the distortion of the latter, are too feeble to make a full impression.

pression on the seat of vision. Objects seen by reflection, as most terrestrial bodies are, cannot be seen distinctly, unless they subtend a certain angle. The same thing taking place in luminous objects, with a smaller angle, when the thread of light becomes too small to be distinctly seen, the exterior limb of the planet will appear confused; and every degree of confusion, arising from a partial defect of light, will operate upon the eye like a real distortion of the object. If this opinion be right, as the distance of centers is easily calculated for any given moment, perhaps the limits of vision, as far as respects luminous objects, may be ascertained by accurate observations of this kind.

Cambridge, 27th December, 1783.

